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CROSS REFERENCE EXAMINER

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BINDER COMPOSITION

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This invention relates to improvements in binders and products produced therefrom, and particularly to a novel composition especially suitable for use in the building industry and is a continuation in part of my co-pending application Serial No. 55,138 filed September 12, 1960, now abandoned.

It is a particular object of the present invention to provide a novel binder or "mortar" composition adapted for bonding masonry units such as concrete, cinder and lightweight blocks, concrete, cinder, lightweight and red clay bricks, and cut stone and ceramic tile and other masonry type products, to each other or to themselves.

It is a further object of the present invention to provide a cementitious bonding material resistant to moisture and weathering conditions and which substantially eliminates the necessity for maintenance.

It is a further object of the present invention to provide a novel mortar which has high tensile strength, as distinguished from conventional mortar, so that production of a subassembly of concrete products or wall sections is possible, since the line of bond formed with the composition of the present invention is stronger than the joined blocks or bricks themselves and will, therefore, not be destroyed at the bond line in handling or transportation.

A further object of the present invention is to provide a mortar for building construction which may be spread in relatively thin layers as compared to the practice with conventional mortar, and yet with increased tensile strength.

A further object of the present invention is to provide a novel structural bonding composition having such high compressive and tensile strength that the need for reinforcing in the mortar joint ordinarily used with blocks of the cement, cinder or lightweight type can in some instances be dispensed with..

A further object of the present invention is to provide a novel structural bonding composition adapted for use as aforesaid which, while having high tensile strength, is possessed of inherent flexibility so that it eliminates or substantially eliminates the need for conventional expansion joints as heretofore employed with cement block construction.

It is a further object of the present invention to provide a plastic binder composition characterized by both inorganic and organic curable binder components.

It is a further object of the present invention to provide novel cured products composed of the foregoing binder composition, or products employing same as a characterizing component.

The general composition of the present invention comprises the employment of an ambient temperature curable liquid synthetic resin and an ambient temperature curing agent therefor; an hydraulic cement and sufficient water to cure the cement; and a plasticizing agent for the composition.

Typical ambient temperature curable resins which can be used as the resin binder constituent are epoxy resins, resorcinol resins, urethane resins, polyester resins, silicone resins, furfural resins, polysulfide resins and their mixtures. These resins in combination with suitable curing agents will provide a workable mortar mix which will cure without the aid of added heat.

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The epoxy resins useful in the present invention are organic compounds which contain at least one oxirane group and polymerizable functionality with ambient temperature curing agents. (This additional polymerizable functionality can be represented by unsaturation, hydroxyl substituents, halogen substituents, amino substituents, and various combinations thereof.)

A typical epoxy resin, which can be used as the resin binder constituent in the present invention, is one containing terminal epoxy groups. Representative of this class is the complex polymeric reaction product of polyhydric phenol with polyfunctional halohydrin, such as epichlorohydrin and glycerol dicholorohydrin. Usually the difunctional chlorohydrin is used in proportions in excess of that equivalent to the polyhydric phenol and less than that which is twice the equivalent amount. The reaction is carried out in the presence of caustic alkali which is usually employed in at least the quantity necessary to combine with the halogen halide liberated from the halohydrin and usually is employed in excess. The products obtained may contain terminal epoxy groups or terminal epoxy groups and terminal primary hydroxyl groups. In the complex reaction mixture, the terminal epoxy groups are generally in excess of the terminal primary hydroxyl groups. Typical polyhydric phenols include resorcinol and preferably the various bisphenols resulting from the condensation of phenol with aldehydes or ketones such as formaldehyde, acetaldehyde, acetone, methyl ethyl ketone, and the like, but preferably acetone or formaldehyde.

The molecular weight of the epoxy resins may be controlled by the relative proportions of the reactants as well as by the extent to which the reaction is carried on. Although the molecular weight of the resin is not critical, the resin should normally be in the form of a liquid, or a solid dissolved in a liquid.

The solid epoxy resins may be dissolved in a solvent such as ethylene glycol, methyl or ethyl ether, or in a reactive diluent such as allyl glycidyl ether or butyl glycidyl ether. The resins further may be modified by materials such as dibutyl phthalate.

The typical commercial epoxy resins, above mentioned and employed herein, are mixtures of polymers, the major component of the resin being the polyglycidyl ethers of polyhydric phenols such as bisphenol-A, and epichlorohydrin. By using an excess of epichlorohydrin, the lower molecular weight liquid polymers are formed, and with higher proportions of bisphenol higher molecular weight solid resins result.

A typical epoxy resin is an amber-colored liquid epoxy resin of medium viscosity at room temperature having an epoxy value of 0.355–0.400 per 100 grams. Another is a liquid epoxy resin having an epoxide equivalent of 180–195 grams of resin containing one gram equivalent of epoxide. Another is a liquid epoxy resin which has a viscosity of 450–650 centipoises at 25° C. and a weight per epoxide of 375–400.

A typical solid epoxy resin which can be used is one which has a softening point at 65–75° C. and an epoxide equivalent of 425–550. Another is one having a softening or melting point of 90–110° C. and an epoxy equivalent of 700–1000. The liquid and solid epoxy resins may be heated together in suitable proportion to form normally liquid resin mixtures. They may be also dissolved in reactive diluents or solvents.

Other typical known and useful epoxy resins are: epoxidized novolak resins prepared by condensing epichlorohydrin with novolak resin; aliphatic polyepoxides such as: poly allyl glycidal ether, butadiene dioxide, and 1,4-butandiol prepared from aliphatic unsaturated hydrocarbons such as butadiene, by epoxidation with peracetic

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